IN THE UNITED STATES PATENT AND TRADEMARK OFFICE		
	Application No.	**09/424,210**
	Filing Date	**November 22, 1999**
	First Named Inventor	**J. TSCHUDI**
	Group Art Unit	**2623**
	Examiner Name	**Colin M. Larose**
	Attorney Docket No.	**2800-107**
Title of the Invention: *METHOD AND APPARATUS FOR MEASURING STRUCTURES IN A FINGERPRINT*		

Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

DECLARATION UNDER 37 C.F.R § 1.132 OF JON TSCHUDI

I Jon Tschudi, hereby declare as follows:

1. I have a M. Sc degree in optics and data analysis from The Norwegian Institute of Technology (now part of the Norwegian University of Science and Technology) in 1988.

2. From 1989-1994 I was employed at Norsk Elektrooptikk AS in Norway as a research engineer.

3. Since 1994, I have been employed by SINTEF, a large Norwegian Research organization (www.sintef.com) and am presently a Senior Research Scientist.

4. My native language is Norwegian, and I am proficient in both written and spoken English.

5. I am the inventor named in United States Patent Application Serial No. 09/424,210, for which purpose this declaration is being submitted. I am familiar with the application, including the currently pending claims.

6. I have reviewed the Office Action of February 25, 2003. The purpose of this declaration is to submit evidence to the Office for overcoming certain rejections raised in that Office Action.

7. Claims 15, 20-21, and 24-25 were rejected because the claims are allegedly not described in the specification in such a way as to convey to one skilled

in the art that, at the time the application was filed, I had possession of the claimed invention. I believe the specification does adequately describe the claimed invention for the reasons set forth below.

8. The Office Action requests clarification regarding support in the original specification for certain language of particular claims. Part of this declaration is to provide clarifying explanations to the Examiner of the intended meanings of certain terms and phrases in this specification, meanings that would be understood by a person of ordinary skill from the context of the descriptions and drawings.

9. In the context of the specification of this application, the term "movement" is synonymous with "speed." Thus, when the specification desribes measuring the movement of the finger, this means measuring the speed of the finger. This is evident from, for example, the following description: "[T]he movement is measured by correlating or comparing the signals from the different sensor lines, and the time lapse or spatial shift between the measurements of corresponding structures in the surface is found." (p. 5, l. 19-23). Correlating the signals (i.e., measurements or images) generated by the different sensor lines and the time lapse or spatial shift between the lines will give the speed of movement of the finger surface across the sensor.

10. The specification further describes a method for adjusting for the movement (that is, the speed) of the finger by maintaining the sample rate while adjusting the number of lines (that is, images) used in generating the segmented image. In the context of the application, adjusting the number of lines means reducing the number of images. The specification further explains that the interval of measurements (which means the spacing between measured lines) is adjusted according to the "movement" (speed) so that at least one measurement of each portion of the fingerprint surface is retained. (p. 5, l. 25-35)

11. As described in the specification, slow finger movement combined with a high sampling frequency (that is, sampling rate) will result in redundant data. (p. 5, l. 25-35). That is, slow finger movement with a high sampling rate can result in images being generated at time intervals that are less than the time required for the finger to move the width of the sensor line. Thus, in the context of the this invention, "redundant data" means overlapping images. The "redundant data" (i.e., overlapping images) is "neglected" (that is, ignored, disregarded, etc.) so that, in the example provided, the two-dimensional segmented image of the fingerprint is comprised by

each second or third set of data (i.e., the images between each second or third image are discarded).

12. The specification further describes a circuit including an amplifier and multiplexer, and A/D-converter, and a programmed computer. (Pg. 5, ln. 39- Pg. 6, ln. 4). This is also shown in Figure 3. As would be understood by a person of ordinary skill in the art, this circuit achieves the function recited in claim 25 (and explained in paragraphs 9-11 above) as "means for determining" and "means for constructing" by executing algorithms that perform the claimed functions.

13. With respect to the claim rejections based on Mainguet, U.S. Patent No. 6,289,114, my invention operates in a completely different manner than described in the '114 patent. In the '114 patent, intentionally overlapping partial images are generated and then reconstituted into a fingerprint image using a complex and computationally intensive algorithm which adjusts the positions of adjacent partial images until the overlapping portions of the images match each other. In my invention, on the other hand, overlapping partial images are discarded and the fingerprint image is formed from only non-overlapping partial images. The algorithm for constructing the fingerprint image in this fashion is much simpler and less computationally intense than that described in the '114 patent.

14. With respect to the rejections based on Setlak, U.S. Patent No. 5,828,773, the Office Action rejects claim 18 stating that "capacitance between electrode 71 and sensor array 78 through finger surface 79 is measured by the sensor elements". I respectfully disagree with this interpretation of Setlak. As is evident from Figure 8 in Setlak, the finger surface 79 is not placed between 71 and 78, either physically or electrically, but rather between 78 and the external, grounded electrode 54.

15. In fact the capacitance between 71 and 78 is constant and independent of the finger, and only determined by the electrode geometry and the dielectric between them. Rather than measuring this capacitance, Setlak measures the changes in the field between the electrode and the sensor array depending on the presence of the finger.

16. The Office Action also states: "figure 6 shows sensor array 78 and electrode 71 are disposed in separate layers". In this arrangement the signal passes directly from the electrode 71 to the sensor array 78. (Col. 6, ln. 66 – Col. 7, ln. 1; Fig. 8). The signal does not pass from a separately-disposed electrode, through the

finger, and to the sensor so that the capacitance or impedance between the electrode and the sensor array can be measured through the finger.

17. In my invention, as opposed to the system described in Setlak, a reference potential is applied at conductive material surrounding the sensor array. (See Pg. 3, ln. 35 - Pg. 4, ln. 2 and Pg. 6, lns. 14-17). The sensor array measures the signal passing from the conductive material through the finger, and this signal is used to determine the capacitance or the impedance through the finger. The signal to the sensor array exists only when the finger is placed over the sensor array and the electrode. (Pg. 6, lns. 35-36).

18. Setlak operates on a completely different basis than my invention. Figure 1 below visualizes the capacitive fingerprint measuring principle described by Setlak. (See also Figure 9 of Setlak). An AC voltage is applied to a drive electrode constituting the bottom plate of a capacitor 83. The top plate of the capacitor 83 is coupled to a voltage amplifying circuit for measuring the output signal. Capacitor 83 is defined between the excitation electrode 71 and the sensing electrode 78. (Col. 7, lns. 3-5). The output signal varies in accordance with the capacitance of the capacitor 85 defined between the finger 79 and grounded electrode 54. (Col. 7, lns. 5-7).

19. In Setlak, the variable capacitance C_85 is measured indirectly. In addition, C_85 comes in parallel with the input capacitance of the amplifier, which is usually much larger. C_85 is therefore only a small part of the total capacitance to ground. Because the measuring principle of Setlak is based on detecting small differences in C_85 representing valleys and ridges (see Col. 7, lines7-9), this implies that it is necessary to detect very small changes in a large number, which is always difficult.

20. Figure 2 below schematically illustrates the operation of the present invention. Although the schematic is not included as a figure in the specification, the concepts embodied in it can be readily understood by a person of ordinary skill from the following passages:

> In the shown embodiment an electrically conducting material 2 surrounds the sensors which may be used to provide a reference potential. Thus the conduction, impedance or capacitance, through the fingerprint, between each of the sensors 1 and the surrounding reference level, may be measured. (p3, l 37 - p4, l 2)

> Figure 3 shows a simplified view of the apparatus according to the invention comprising conductors from the sensors 1 to an amplifier.... (p5, l 39 – p6, l 1)
>
> In one embodiment, a sinus of 100 kHz is applied to the conducting area 14, and each of the conductors 11 is terminated by a resistance, and the signal is amplified.... (p6, l 31 – 33)
>
> In the embodiment comprising capacitance measurements an insulating layer (not shown) is provided between the conductor ends and the fingerprint. (p7, l 24-26)

21. For the structure of the present invention, as illustrated in figure 2 below, the situation is different from Setlak. The signal of my invention is always proportional to the magnitude of C (i.e., the finger, which corresponds to C_85 in Setlak). Unlike Setlak, in my invention the parasitic input capacitance of the amplifier will come in parallel with the terminating resistor R, and not with C. The value of C is therefore obtained in a more direct way, which gives a more robust measurement system.

22. The differences between the my invention and the sensor of Setlak can be simply demonstrated by the following simple example. The Setlak sensor is analogous to a circuit that powers a light bulb. The light bulb is constantly illuminated, but if one were to place his finger on the circuit, the intensity of the light bulb would change. It is the change in intensity the Setlak measures to derive the fingerprint characteristics. My invention is analogous to a light bulb circuit that is open until one completes the circuit with his finger to cause the bulb to light up. In my invention the fingerprint characteristics are derived from the intensity of the bulb, not the change in intensity as in Setlak.

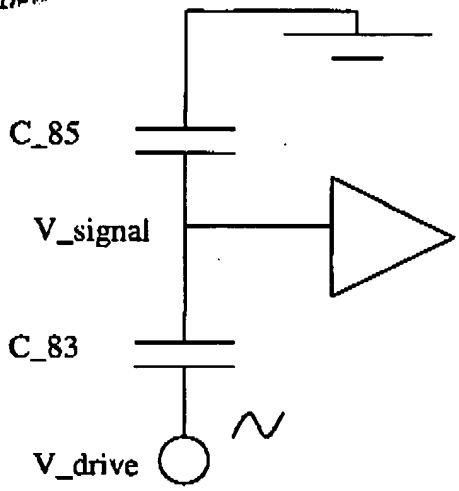

Figure 1 Setlak

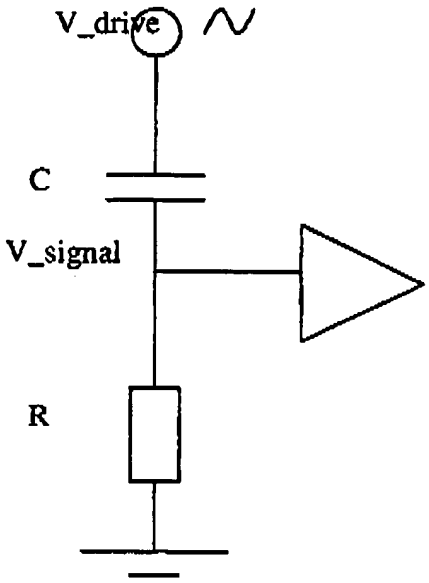

Figure 2 Tschudi

I further declare that all statements made herein of my own knowledge are true and all statements made on information and belief are believed to be true and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Jon Tschudi

2003-06-20
Date